Figure 1

104

Server

Network
102

106 — Storage

108

Client

110

Client

112

Client

Network Data Processing
System
100

Processor
202

Processor
204

206

System Bus

208

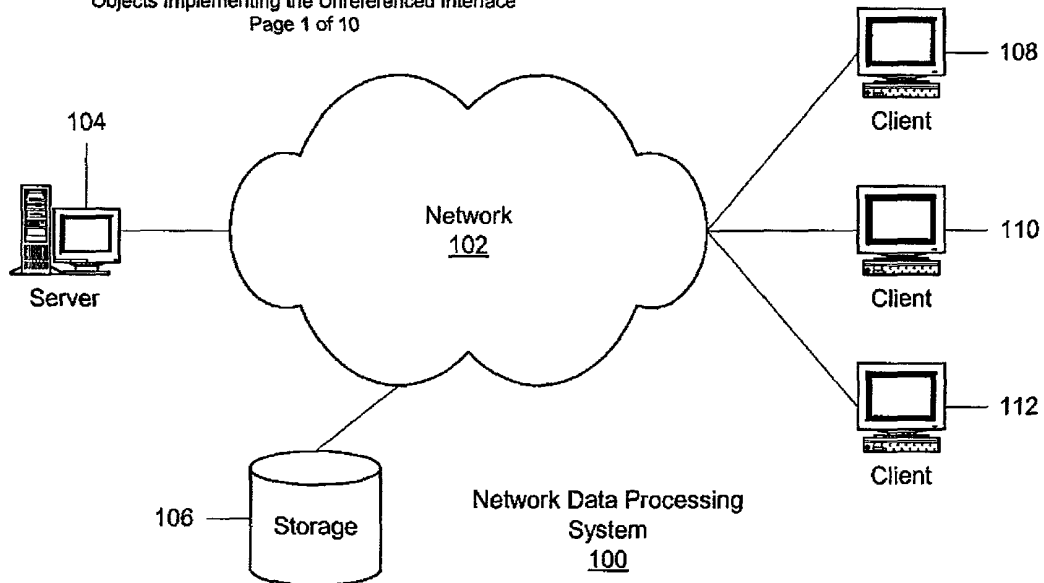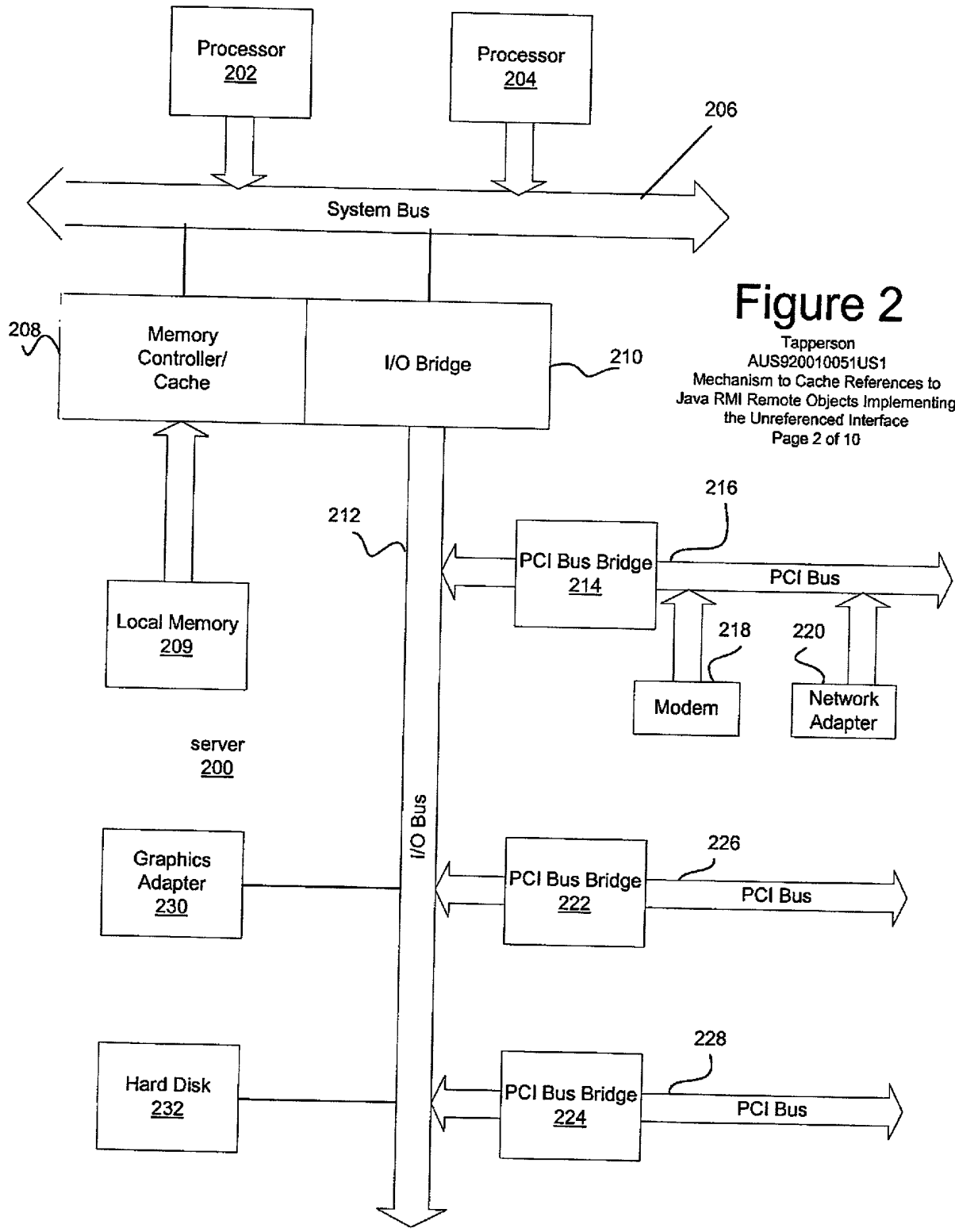Memory
Controller/
Cache

I/O Bridge
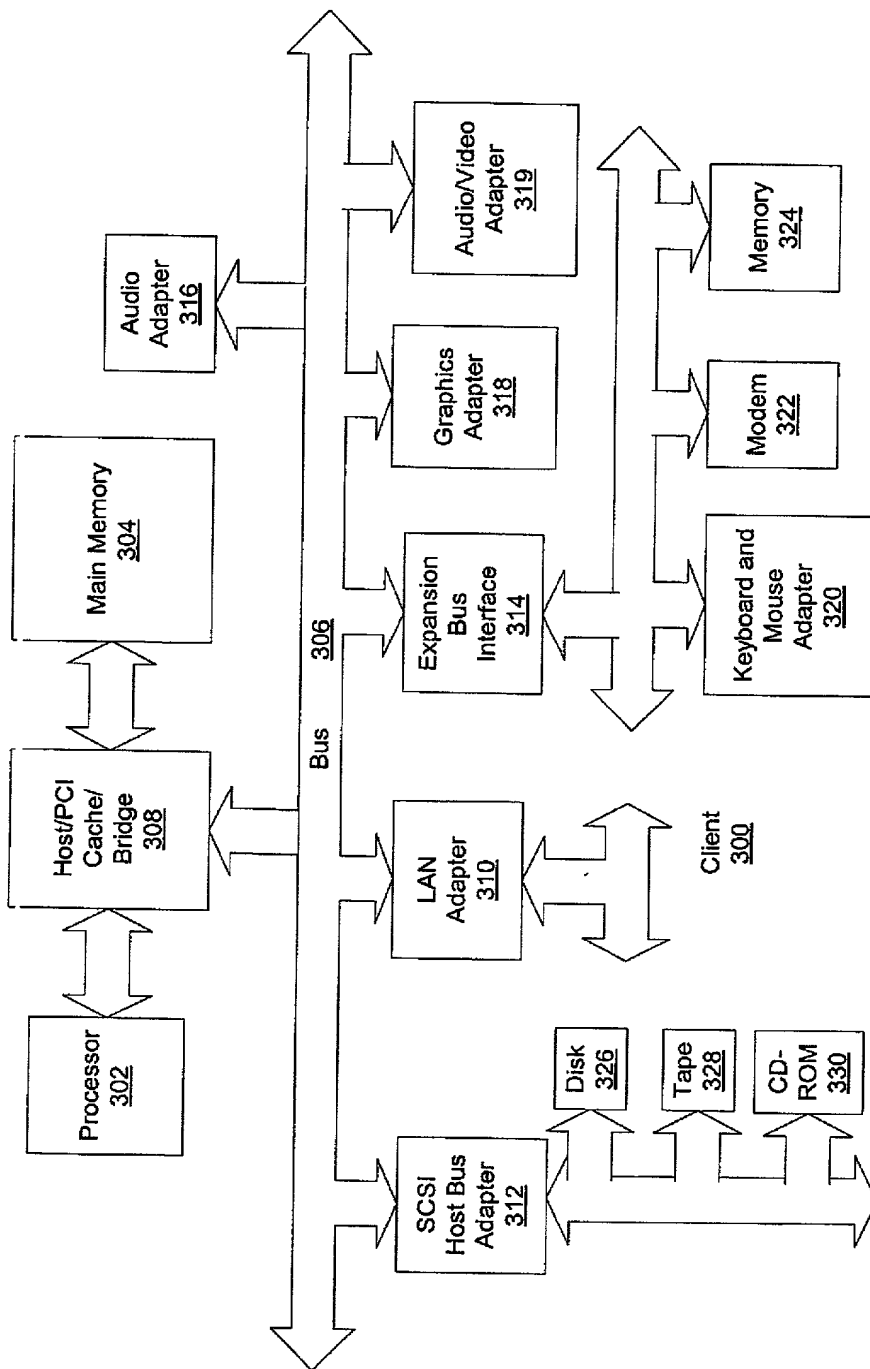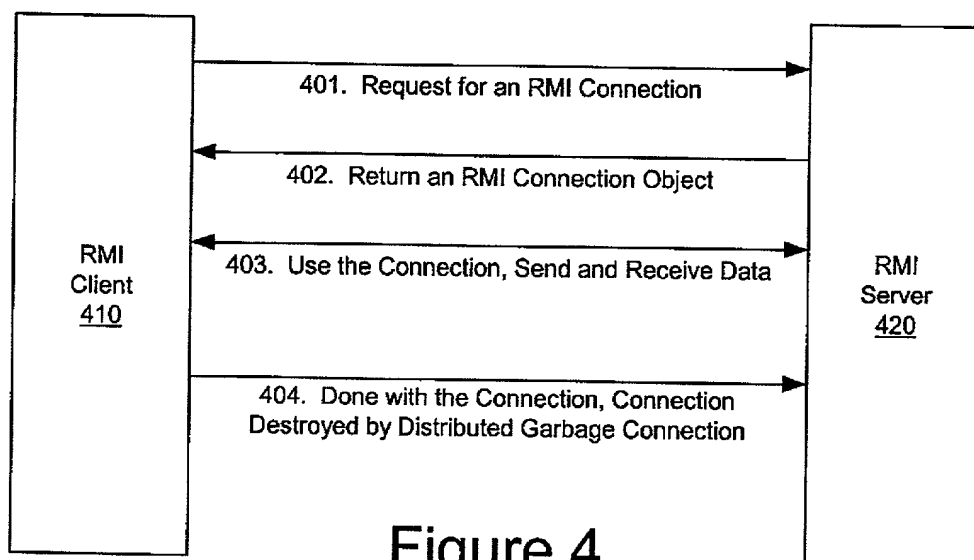
210

Figure 2

Tapperson
AUS920010051US1
Mechanism to Cache References to
Java RMI Remote Objects Implementing
the Unreferenced Interface
Page 2 of 10
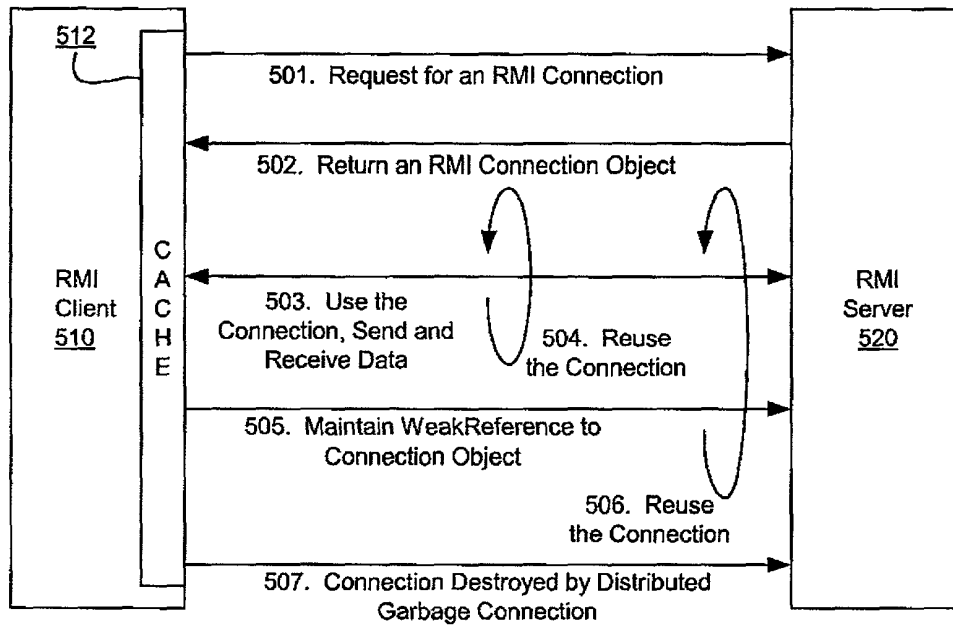
216

212

PCI Bus Bridge
214

PCI Bus

218   220

Local Memory
209

Modem

Network
Adapter

server
200

I/O Bus

Graphics
Adapter
230

226

PCI Bus Bridge
222

PCI Bus

Hard Disk
232

228

PCI Bus Bridge
224

PCI Bus

Processor 302	Host/PCI Cache/Bridge 308	Main Memory 304	

Audio Adapter 316

Audio/Video Adapter 319

Graphics Adapter 318

Memory 324

Modem 322

Expansion Bus Interface 314

Keyboard and Mouse Adapter 320

Bus 306

LAN Adapter 310

Client 300

SCSI Host Bus Adapter 312

Disk 326

Tape 328

CD-ROM 330

Figure 3

RMI
Client
410

RMI
Server
420

401. Request for an RMI Connection

402. Return an RMI Connection Object

403. Use the Connection, Send and Receive Data

404. Done with the Connection, Connection
Destroyed by Distributed Garbage Connection

Figure 4

PRIOR ART

512

501. Request for an RMI Connection

502. Return an RMI Connection Object

RMI
Client
510

C
A
C
H
E

503. Use the
Connection, Send and
Receive Data

504. Reuse
the Connection

RMI
Server
520

505. Maintain WeakReference to
Connection Object

506. Reuse
the Connection

507. Connection Destroyed by Distributed
Garbage Connection

Figure 5

Tapperson
AUS920010051US1
Mechanism to Cache References to Java RMI Remote
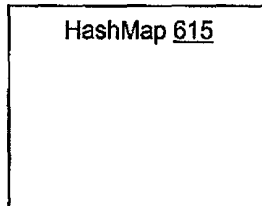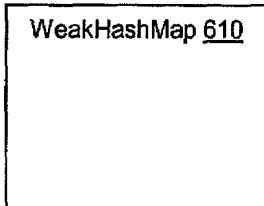Objects Implementing the Unreferenced Interface
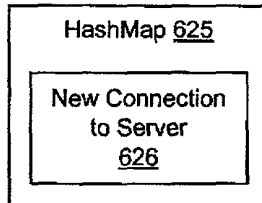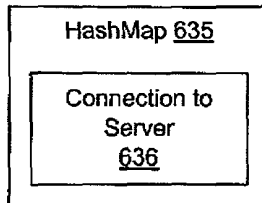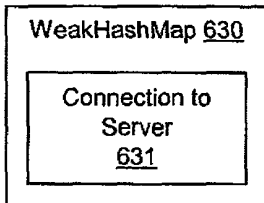Page 5 of 10
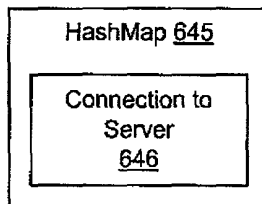
Before

WeakHashMap 610	HashMap 615

Figure 6A

Tapperson
AUS920010051US1
Mechanism to Cache References to
Java RMI Remote Objects Implementing
the Unreferenced Interface
Page 6 of 10

After

WeakHashMap 620	HashMap 625
New Connection to Server 621	New Connection to Server 626

Before

WeakHashMap 630	HashMap 635
Connection to Server 631	Connection to Server 636

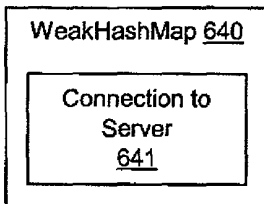# Figure 6B

Tapperson
AUS920010051US1
Mechanism to Cache References to
Java RMI Remote Objects Implementing
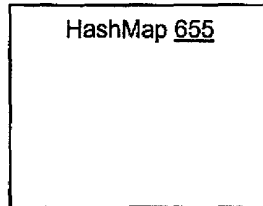the Unreferenced Interface
Page 6 of 10

After

WeakHashMap 640	HashMap 645
Connection to Server 641	Connection to Server 646

Before

WeakHashMap 650

Connection to
Server
651

HashMap 655

After

WeakHashMap 660

Connection to
Server
661

HashMap 665

Connection to
Server
666

Figure 6C

Tapperson
AUS920010051US1
Mechanism to Cache References to
Java RMI Remote Objects Implementing
the Unreferenced Interface
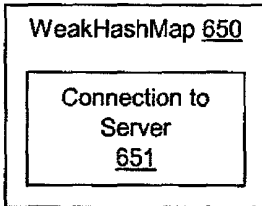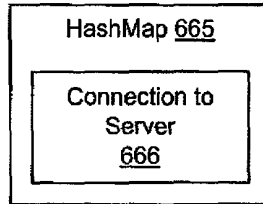Page 7 of 10

Before
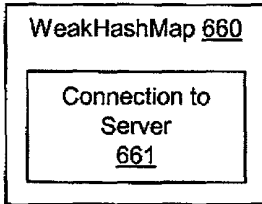
WeakHashMap 670

Connection to
Server
671

HashMap 675

Figure 6D

Tapperson
AUS920010051US1
Mechanism to Cache References to
Java RMI Remote Objects Implementing
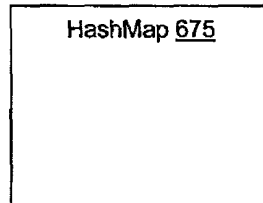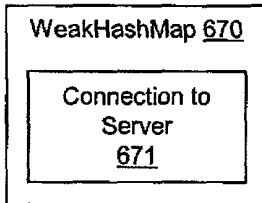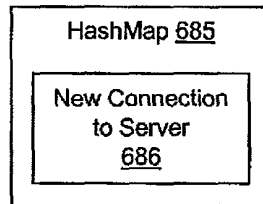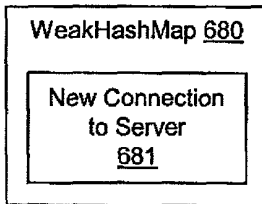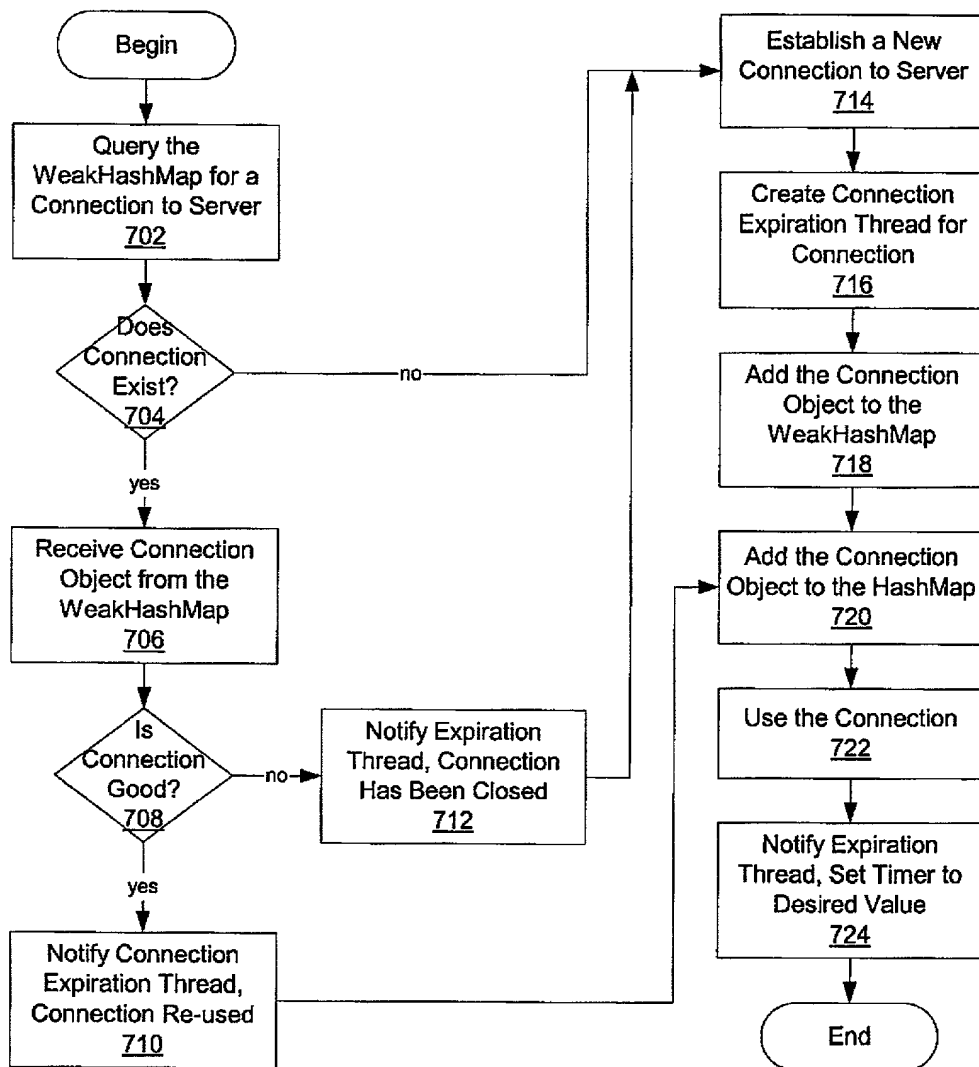the Unreferenced Interface
Page 7 of 10

After

WeakHashMap 680

New Connection
to Server
681

HashMap 685

New Connection
to Server
686

Figure 7

Begin

Query the WeakHashMap for a Connection to Server
702

Does Connection Exist?
704

—no→

yes

Receive Connection Object from the WeakHashMap
706

Is Connection Good?
708

—no→

Notify Expiration Thread, Connection Has Been Closed
712

yes

Notify Connection Expiration Thread, Connection Re-used
710

Establish a New Connection to Server
714

Create Connection Expiration Thread for Connection
716

Add the Connection Object to the WeakHashMap
718

Add the Connection Object to the HashMap
720

Use the Connection
722

Notify Expiration Thread, Set Timer to Desired Value
724

End

Figure 8

(Begin)

↓

Enter Efficient Wait State and
Wait to be Notified to End or to
Set the Expiration Timer
802

↓

Connection
Closed?
804

—yes→ (End)

—no→

Enter Efficient Wait
State and Wait for
Expiration Timer or
Notification
806

→

Timer
Expire?
808

—yes→

Remove
Connection
from HashMap
810

no ↑

(Begin)

↓

Create Connection
902

↓

Export the Connection
in RMI Runtime
Environment
904

↓

Send Connection
Object to RMI Client
906

→

Enter Efficient Wait
State and Wait to be
Notified by
Unreferenced Interface
908

↓

Unexport the
Connection from
RMI Runtime
910

↓

Connection
Available to be
Garbage Collected
912

↓

(End)

Figure 9

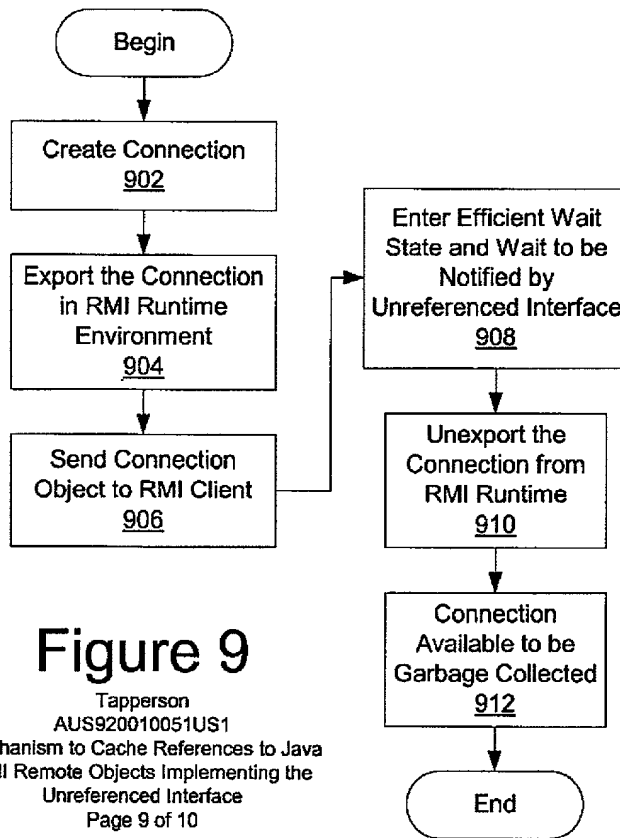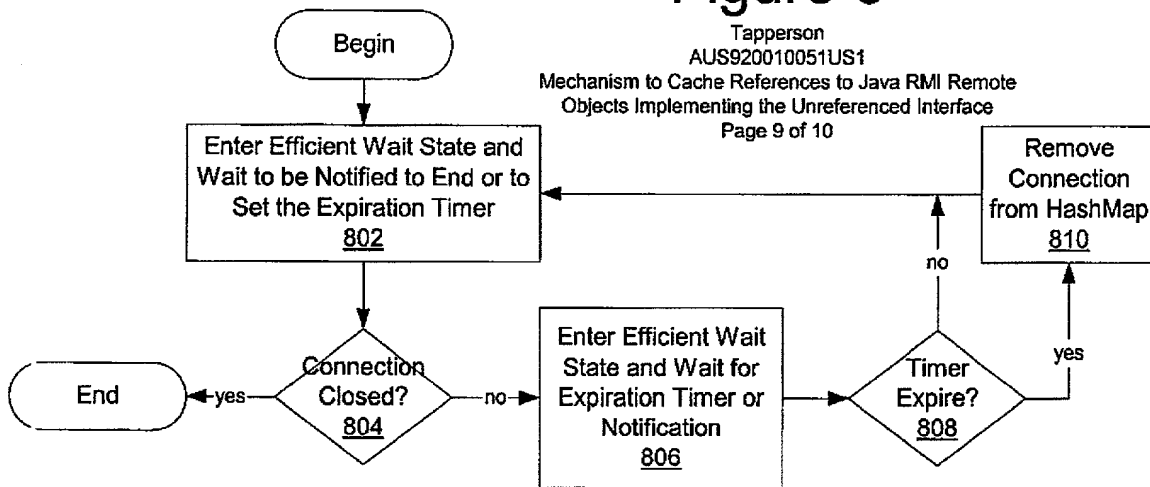Tapperson
AUS920010051US1
Mechanism to Cache References to Java
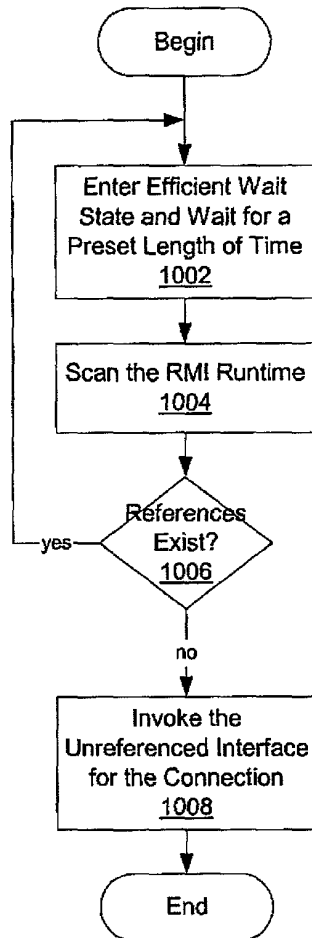RMI Remote Objects Implementing the
Unreferenced Interface
Page 9 of 10

Figure 10

Tapperson
AUS920010051US1
Mechanism to Cache References to Java RMI Remote
Objects Implementing the Unreferenced Interface